

## Statewide Summary for Florida

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### Background

The State of Florida (Figure 1) is approximately 151,670 km<sup>2</sup> (58,560 mi<sup>2</sup>) large with an average elevation of 30.5 m (100 ft) (Dahl, 2005). The Florida gulf coast stretches approximately 1,000 km (621 miles) from the Alabama State line to the Dry Tortugas in the Florida Keys (Handley et al., 2007). The climate varies along the coast, ranging from temperate continental in the panhandle to oceanic subtropical in the Keys. Due to this climatic gradient, the Gulf coast of Florida is divisible into two ecoregions, the Louisianian in the north along the panhandle, and the West Indian in the south along the length of the peninsula (Bailey 1978). The Lousianian ecoregion extends from Cedar Key north and west along the panhandle to the Alabama state line. It is characterized by extensive emergent coastal wetlands, temperate fauna, small tidal ranges (<1.0 m, [<3 ft]), and low wave energy (Cowardin et al., 1979). The West Indian ecoregion ranges from Cedar Key to the Florida Keys and is characterized by tropical flora and fauna (including mangrove wetlands), small tidal ranges (<1.0 m, [<3 ft]), and low wave energy (Lewis III, 1989). In both ecoregions, winters are mild, and summers are hot, with a considerable amount of rainfall (approximately 102-152 cm [40-60 in]) occurring during the wet season from late June through late October.

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In the early 19<sup>th</sup> century, Florida contained over 8,094,000 hectares (20 million acres) of wetlands (Dahl, 2005). By 1996, only 56 percent of this area remained. Approximately 90 percent of these wetlands are in freshwater systems; the remaining 10 percent constitute the state's marine and estuarine intertidal wetlands. Approximately 29 percent (approximately 4,613,416 hectares [11.4 million acres]) of the State of Florida is wetland habitat, more than any other state in the conterminous United States. Approximately 8 percent of the nation's estuarine emergent wetlands are found in Florida.

Florida was ranked the fourth most populous state in 2010; its population was nearly 19.1 million in 2011. As of 2011, more than 12 million people live in its coastal counties. Approximately one-fifth of the State's total population lives in the eight counties encompassing southwest Florida, ranging from Tampa Bay to the Florida Keys. There are nearly 1,000,000 boats registered in the state of Florida. Tourism is the State's leading industry; agriculture is second. The recreational and tourist use of Florida's wetlands for activities such as boating, fishing, water sports, and wildlife viewing and/or hunting is high. Commercial, industrial, and residential land use also affects Florida's wetlands. Florida remains one of the fastest growing states in the nation.

The State of Florida is home to approximately 283 species of birds, 126 species of fishes, 122 species of reptiles, 75 species of mammals, and 57 species of amphibians (Dahl, 2005). Seventeen percent of these species are found only in Florida and nowhere else in the United States. There are 42 endangered species of wildlife found in the State. Thirteen species of shorebirds and 90 percent of loggerhead sea turtles found in the U.S. nest on Florida's coastal beaches. Florida's wetlands provide important habitat for

waterbirds such as egrets, herons, ibises, spoonbills, and storks, as well as many fishery species such as shrimp, crabs, oysters, and various finfish.

### **Statewide Status and Trends**

The most recent status data for Florida were collected during various time periods for different parts of the State (see Chapter A, Figure 4 for more detail). This status includes 110,596 hectares (273,289 acres) of estuarine emergent wetlands, 143,572 hectares (354,773 acres) of palustrine emergent wetlands, and a total of 254,168 hectares (628,062 acres) of emergent wetlands in coastal Florida (Figure 2). Historical trend data for coastal Florida are examined in the Tampa Bay and Florida Panhandle vignettes.

### **Causes of Change**

Coastal development and urban expansion, including the construction of bridges, roads, and buildings, have caused the greatest losses to estuarine wetlands in Florida (Dahl, 2005). After development, agriculture has been the second greatest cause of wetland loss. Many palustrine emergent wetlands have been converted to agricultural land for greenhouses and production of citrus crops, sod, and other ornamental plants. The extensive growth and development in Florida have increased the threat of invasive species being released into the State's ecosystems, disrupting native animal and plant communities. Hydrilla, water hyacinth, and Brazilian pepper are three of the primary harmful exotic species in Florida. Palustrine emergent wetlands have declined more than any other type of freshwater wetland in Florida. Another minor cause of emergent wetland loss in Florida has been conversion to deepwater habitat.

Hydrological modification, nutrient loading, and degraded water quality are some of the greatest human threats to estuarine ecosystems in Florida (Handley et al., 2007). Before control measures were implemented in the 1970s, extensive dredging in the 1950s and 1960s caused habitat loss in several of Florida's estuaries; many residential developments in areas such as Tampa Bay and Sarasota Bay were created by numerous dredging projects that filled in estuaries. Congressionally-mandated hydrological modifications that occurred in the Everglades in the late 1940s and 1950s, intended to prevent flooding, irrigate agricultural land, and provide drinking water, resulted in the loss of 1.7 billion gallons of water from the Everglades that has since resulted in compromised water quality and the loss of half of the Everglades (U.S. Army Corps of Engineers, 2011). Degradation of water quality has occurred as waste from residential, industrial, and agricultural areas has entered Florida's estuaries. Particularly responsible for degraded water quality are pollutants such as herbicides, metals, and hydrocarbons from sources such as power plants and paper mills. As excess nutrient runoff enters the waterways and bays, phytoplankton blooms occur, thus increasing light attenuation, increasing turbidity, and reducing oxygen. Regulations have reduced point sources of pollution, but nonpoint sources of pollution remain a large threat. As the coastal population of Florida grows steadily, so too does the level of pollution, development, and other threats to Florida's emergent wetlands.

Global climate change brings the threat of sea-level rise and altered weather patterns. The primary threat of sea-level rise to emergent tidal wetlands is the decrease of available space for the landward migration necessary to maintain these ecosystems. Additionally, sea-level rise may increase habitat loss caused by erosion and accretion of

unconsolidated sediments. The estimated impacts of climate change and sea-level rise on coastal habitats in Florida using existing sea-level rise models include significant reductions in salt marsh (-86%) and oligohaline marsh (-59%) habitats, while mangroves were projected to increase by 166% by 2100 (Glick and Clough, 2006). Storm surge, flooding, and extreme temperatures associated with changing weather patterns will also have significant impacts on Florida's coastal resources (Florida Oceans and Coastal Council, 2009).

### **Overview of Emergent Wetland Restoration Efforts**

Numerous state and federal agencies hold regulatory authority over coastal wetland protection in the state of Florida. These agencies include the Department of Environmental Protection (DEP), Northwest Florida Water Management District (NFWFMD), Suwannee River Water Management District (SRWMD), Southwest Florida Water Management District (SWFWMD), South Florida Water Management District (SFWMD), Florida Fish and Wildlife Conservation Commission (FWC), the US Fish and Wildlife Service (USFWS), the National Oceanic and Atmospheric Administration (NOAA), the Environmental Protection Agency (EPA), and the US Army Corps of Engineers (USACE). Additionally, Florida's coastal wetlands along the Gulf are served by a network of National Estuary Programs and National Estuarine Research Reserves (NERR), including the Tampa Bay Estuary Program, Charlotte Harbor National Estuary Program, Sarasota Bay Estuary Program, Apalachicola NERR, and Rookery Bay NERR. Other non-profit organizations with interests in coastal wetland preservation and restoration include Florida Sea Grant, Tampa Bay Watch, Ocean Conservancy, and The Nature Conservancy, as well as numerous university and academic research entities.

Restoration efforts for emergent wetlands on the Gulf Coast of Florida have varied among different geographic regions and individual wetland areas. The restoration projects that have been completed in Tampa Bay are often regarded as state-of-the-art, with experimental restoration techniques that progress the science of restoration ecology. Specific examples are described in the Tampa Bay region vignette.

### **Overview of Monitoring, Restoration, and Enhancement Opportunities**

Most large-scale monitoring of wetlands is conducted via aerial photographic surveys, which are conducted on a regular basis by the Water Management Districts and the DEP. EPA monitoring and assessment methods can be applied to Florida at a statewide scale to infer emergent wetland condition based on established correlations with assessment methods (Reiss, 2007). Tampa Bay Estuary Program is planning to implement a long-term *in situ* monitoring program for the coastal wetlands of Tampa Bay; however, no regional or statewide long-term monitoring datasets currently exist in Florida other than aerial photographic surveys and site-specific (local) monitoring efforts by individual agencies or institutions. Therefore, comprehensive long-term field monitoring of coastal wetlands represents an opportunity to understand how climate change and anthropogenic pressures are affecting the coastal wetlands of Florida's Gulf coast.

Coastal wetland restoration efforts in Florida are limited largely by funding availability and the ability to secure lands for restoration and conservation. Coastal lands are in high demand in Florida, and coastal development directly competes with the ability to restore and conserve coastal wetlands. Emergent wetlands restoration efforts have been

focused on public lands where permitting issues are simplified. Significant efforts have been made for more than twenty years to purchase lands for public ownership to speed up implementation of management, but continued efforts are required to acquire coastal wetland property that will allow for implementation of best management practices (Rey, 2012).

Dredging and ditching for mosquito control has resulted in some of the most significant degradation to emergent wetlands. Restoration efforts to reconnect hydrology in these altered landscapes have been shown to improve water quality in saltwater marsh habitats (Rey et al., 1992; Carlson, 1983; Rey and Kain, 1993). The Florida Coordinating Council on Mosquito Control's Subcommittee on Managed Marshes has overseen interagency cooperative efforts to implement management and restoration techniques that minimize the environmental impacts of mosquito control.

Funding for coastal wetlands restoration in Florida has come from various levels of government: federal, state, and local. The Water Management District Surface Water Improvement and Management Programs have identified restoration priorities and implemented restoration projects. Other state programs that currently support wetland restoration efforts include Saltwater Fishing License funds and Florida Forever restoration funds. Federal sources of funding for wetlands restoration in Florida include EPA National Estuary Program Comprehensive Conservation and Management Plans implementation money, NOAA Recovery Act grants, and USFWS National Coastal Wetland Conservation Grant Program.

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Figure 1. Florida state map.

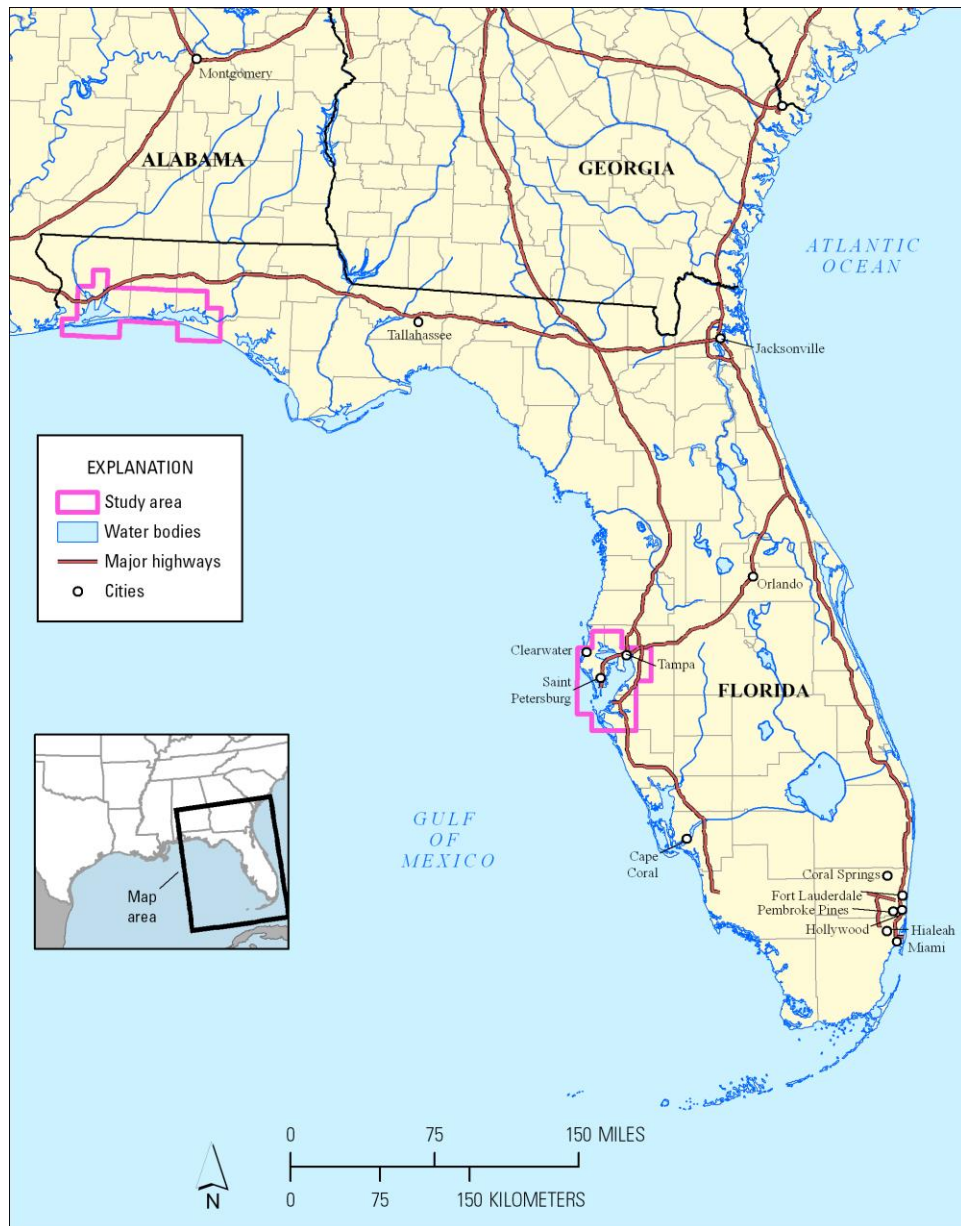


Figure 2. Most recent status of Florida emergent wetlands, 1972-2011.

